IN THE CLAIMS:

Please amend the claims as follows.

1. (Currently amended). A method for producing a lithographically printed image having a reduced critical dimension, the method comprising ~~the steps of~~:

~~(a)~~ providing a semiconductor substrate ~~optionally having at least a hardmask defined thereon~~;

~~(b)~~ providing an underlayer on said ~~hardmask~~ substrate wherein said underlayer is a tuned polymer substantially free of any element that forms a non-volatile oxide;

~~(c)~~ providing a ~~PR~~ photoresist layer on said underlayer, wherein said photoresist comprises a material capable of forming a non-volatile, etch-resistant oxide;

~~(d)~~ imagewise exposing said ~~PR~~ photoresist layer to radiation forming an image in said photoresist ~~PR~~;

~~(e)~~ transferring said image into said underlayer; and

~~(f)~~ performing a controlled overetch of said underlayer.

~~plasma~~ etching said underlayer with a plasma ~~, wherein the reactive species of said plasma comprises oxygen~~; and

performing a controlled lateral thinning of said underlayer.

2. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said underlayer comprises less than 9% silicon.

3. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said underlayer comprises a tuned polymer.

4. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said underlayer is

substantially free of any element that forms a non-volatile oxide wherein said element is selected from the group consisting of silicon, boron, phosphorous, germanium, and aluminum.

5. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said photoresist comprises an element capable of forming a non-volatile, etch-resistant oxide selected from the group consisting of silicon, boron, phosphorous, germanium, and.

6. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein the reactive species of said plasma comprises ~~an element~~ neutrals and ions selected from the group consisting of oxygen, hydrogen, fluorine, and chlorine.

A's cont'd

7. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said underlayer comprises a tuned polymer comprising carbon, hydrogen, and oxygen.

8. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said underlayer comprises an antireflective coating.

9. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said ~~PR~~ photoresist comprises a radiation-sensitive acid generator.

10. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said photoresist comprises a polymer having acid-cleavable moieties bound thereto.

11. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said photoresist comprises a polymer formed by polymerizing one or more monomers selected from the group consisting of acrylate, methacrylate, hydroxystyrene optionally substituted with C_{1-6}-alkyl, C_{5-20} cyclic olefin monomers, and combinations thereof, the polymer having acid-cleavable moieties bound thereto, wherein all such moieties are silylethoxy groups optionally substituted on the ethoxy portion thereof with C_{1-6}-alkyl, phenyl, or benzyl.

12. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said radiation is selected from the group consisting of electromagnetic radiation, 157-365 nm ultraviolet radiation, euv, electron beam radiation, and hard and soft x-ray radiation.

A5 cont'd

13. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said radiation comprises ultraviolet radiation or extreme ultraviolet radiation.

14. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim ~~1~~ 12, wherein said ultraviolet radiation comprises substantially monochromatic radiation having a wavelength of from about 157 nm to about 365 nm.

15. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim ~~1~~ 12, wherein said ultraviolet radiation comprises substantially monochromatic radiation having a wavelength selected from the group consisting of 157, 193, 248, 254, and 365 nm.

16. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said radiation comprises x-ray radiation.

17. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said photoresist comprises a stable, etch-resistant, non-volatile oxide-forming material selected from the group consisting of silicon, phosphorous, germanium, aluminum, and boron.

As Cont'd

18. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said plasma comprises a reactive species selected from the group consisting of oxygen, hydrogen, fluorine, and chlorine.

19. (Currently amended) The ~~A~~ method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said tuned polymer comprises an organic polymer selected from the group consisting of phenolic polymers, novolacs, epoxies, and diamond-like carbon.

20. (Currently amended) The ~~A~~ method for producing a lithographically printed image having a reduced critical dimension, according to claim 1, wherein transferring said image comprises plasma reactive-ion etching.

21. (Currently amended) The ~~A~~ method for producing a lithographically printed image having a reduced critical dimension, according to claim 18, wherein said reactive species comprise neutrals and ions.

22. (Currently amended) The ~~A~~ method for producing a lithographically printed image having a reduced critical dimension, according to claim 1, wherein performing controlled overetch comprises controlling the etch rate.

23. (Currently amended) The ~~A~~ method for producing a lithographically printed image having a reduced critical dimension, according to claim 22, wherein controlling said etch rate comprises adding a non-reactive diluent gas to said plasma.

24. (Currently amended) The ~~A~~ method for producing a lithographically printed image having a reduced critical dimension, according to claim 23, wherein said non-reactive diluent gas comprises nitrogen and noble gasses.

25. (Currently amended) The ~~A~~ method for producing a lithographically printed image having a reduced critical dimension, according to claim 22, wherein controlling said etch rate comprises regulating process parameters.

26. (Currently amended) The ~~A~~ method for producing a lithographically printed image having a reduced critical dimension, according to claim ~~22~~ 25, wherein said process parameters consist of variables selected from the group consisting of the duration of etch, the rf power, operating pressure, gas flowrates, backside He pressure, electrode temperature, and wall temperature.

27. (Currently amended) ~~The~~ A The reduced critical dimension bilayer resist image comprising:

a semiconductor substrate;

an organic layer provided on said substrate; and a photoresist layer provided on said organic layer, wherein said photoresist layer has a first image developed therein, and wherein said organic layer has a second image, of reduced critical dimension and congruent with said first image, developed therein.

28. (Currently amended) A method of using a reduced critical dimension bilayer resist image comprising ~~the steps of~~:

~~(a)~~ providing a substrate;

~~(b)~~ forming a reduced critical dimension bilayer resist image on said substrate;

~~(c)~~ transferring said image into said substrate forming a circuit image; and

~~(d)~~ forming circuit element materials in said circuit image.

29. (Currently amended) The ~~A~~ method of using the reduced critical dimension bilayer resist image, according to claim 25 wherein said circuit element materials comprise materials selected from the group consisting of dielectric, conductor, semiconductor, and doped semiconductor materials.

30. (Currently amended) A ~~The~~ semiconductor device fabricated using a reduced critical dimension bilayer resist image.

31. (New). The method for reducing the critical dimension of a lithographically printed feature, according to claim 1, wherein said substrate has a hardmask defined thereon, and said underlayer is provided on said hardmask.